I claim:

52. In a storage battery comprising a plurality of lead plates in a closed case, a fibrous sheet plate separator between adjacent ones of said plates, and a body of a sulfuric acid electrolyte absorbed by each of said separators and maintained in contact with each of the adjacent ones of said plates, the improvement wherein said separator sheets consist essentially of intermeshed glass fibers, intermeshed organic fibers, or intermeshed glass and organic fibers produced by opening bundles of the fibers, suspending the carded fibers in a gaseous medium, carding the suspended fibers and collecting the carded fibers on a foraminous material, with the proviso that the mass of fibers has a BET surface area of from 0.2 to 5 m^2 per gram.

53. In a storage battery as claimed in claim 52, the improvement wherein at least two different kinds of bundled organic fibers are carded, and the fibers of one kind have a melting temperature at least 20° C. lower than the melting temperature of the fibers of the other kind.

54. In a storage battery as claimed in claim 52, the improvement wherein the suspended fibers comprise organic fibers.

55. In a storage battery as claimed in claim 54, the improvement wherein the organic fibers are polyolefin.

56. In a storage battery as claimed in claim 55, the improvement wherein the polyolefin fibers are treated to make them hydrophilic.

57. In a storage battery as claimed in claim 56, the improvement wherein the polyolefin fibers are treated to make them hydrophilic by acrylic acid grafting.

58. In a storage battery as claimed in claim 56, the improvement wherein the polyolefin fibers are treated by sulfonation to make them hydrophilic.

59. In a storage battery as claimed in claim 56, the improvement wherein the polyolyfin fibers which are carded contain an internal wetting agent which has migrated to the fiber surfaces to make the surfaces hydrophylic.

60. In a storage battery as claimed in claim 54, the improvement wherein the organic fibers are polyester.

61. In a storage battery as claimed in claim 60, the improvement wherein the outer surfaces of the polyester fibers are rough, and the roughness improves the ability of the fiber to wick.

62. In a storage battery as claimed in claim 54, the improvement wherein the organic fibers are acrylic.

63. In a storage battery as claimed in claim 62, the improvement wherein the organic acrylic fibers are fibrillated.

64. In a storage battery as claimed in claim 46, the improvement wherein the suspended and collected fibers are predominantly glass microfibers and chopped glass strand fibers.

65. In a storage battery as claimed in claim 46, the improvement wherein the suspended and collected fibers are glass microfibers, chopped glass strand fibers or both and from 5 to 95 percent w/w organic fibers.

66. In a storage battery as claimed in claim 65, the improvement wherein the organic fibers are polyolefin fibers.

67. In a storage battery as claimed in claim 65, the improvement wherein the organic fibers are Sulfar fibers.

68. In a storage battery as claimed in claim 65, the improvement wherein the organic fibers are polyester fibers.

69. In a storage battery as claimed in claim 65, the improvement wherein the organic fibers are acrylic fibers.

70. In a storage battery as claimed in claim 65, the improvement wherein the organic fibers are cellulose fibers.

71. In a storage battery as claimed in claim 65, the improvement wherein at least some of the organic fibers are bi-component fibers.

72. In a storage battery as claimed in claim 71, the improvement wherein the bi-component fibers act as a binder for the separator to improve the toughness of the separator, the cycling characteristics of the battery, and the resistance of the battery to vibration.

73. In a storage battery as claimed in claim 72, the improvement wherein the mullen bursting strength of said separator is higher when in the wetted condition than that of an otherwise identical, 100% microglass separator in the dry, as received, condition.

74. In a storage battery as claimed in claim 72, the improvement wherein the maximum mullen bursting strength of the separator is at least twice that of an otherwise

identical, 100% microglass separator.

75. In a storage battery as claimed in claim 52, the improvement wherein some of the intermeshed fibers are glass microfibers having a BET surface area of from 0.2 to 5 m^2 per gram.

76. In a storage battery as claimed in claim 65, the improvement wherein the suspended glass fibers are a mixture of microfibers and chopped glass strand fibers.

77. In a storage battery as claimed in claim 52, the improvement wherein the separator is composed of organic fibers and a particulate inorganic material which was suspended in the gaseous medium with the organic fibers.

78. In a storage battery as claimed in claim 77, the improvement wherein the particulate material constitutes from 5 percent w/w to 90 percent w/w of the total of organic fibers and particulate material.

79. In a storage battery as claimed in claim 54, the improvement wherein at least some of the organic fibers are bi-component fibers.

80. In a storage battery as claimed in claim 79, the improvement wherein at least some of the bi-component fibers are thermally bonded to adjacent fibers at points of contact.

81. In a storage battery as claimed in claim 52, the improvement wherein at least some of the fibers are bi-component fibers.

82. In a storage battery as claimed in claim 52, the improvement wherein at least two different kinds of bundled organic fibers are carded, suspended and collected, and the fibers of one kind have a melting temperature at least 20° C. lower than the melting temperature of the fibers of the other kind.

83. In a storage battery as claimed in claim 54, the improvement wherein the suspended organic fibers are Sulfar.

84. In a storage battery as claimed in claim 49, the improvement wherein the inorganic particulate material increases the BET surface area of the separator by at least 100 m^2/g and improves the stratification of the battery during float or cycle applications.

85. In a storage battery as claimed in claim 46, the improvement wherein the compositions of the several layers differ from one another.

87. In a storage battery comprising a plurality of lead plates in a closed case, a fibrous sheet plate separator between adjacent ones of said plates, and a body of a sulfuric acid electrolyte absorbed by each of said separators and maintained in contact with each of the adjacent ones of said plates, the improvement wherein said separator sheets consist essentially of intermeshed glass fibers, and are at least 10 percent lighter in weight per unit of area than otherwise identical, conventional, wet laid separator having the same BCI thickness, with the proviso that the mass of fibers suspended and collected has a BET surface area of from 0.2 to 5 m^2 per gram.

88. In a storage battery comprising a plurality of lead plates in a closed case, a fibrous sheet plate separator between adjacent ones of said plates, and a body of a sulfuric acid electrolyte absorbed by each of said separators and maintained in contact with each of the adjacent ones of said plates, the improvement wherein said separator sheets consist essentially of intermeshed glass fibers which have such a degree of resilience that the sheets are at least 10 percent lighter in weight per unit of area than otherwise identical, conventional, wet laid separator made from an identical blend of glass fibers, and having the same BCI thickness, with the proviso that the mass of fibers suspended and collected has a BET surface area of from 0.2 to 5 m^2 per gram.

89. A fibrous sheet plate separator which consists essentially of intermeshed glass fibers produced by suspending glass fibers in a gaseous medium, collecting the suspended glass fibers on a foraminous material, and separating the collected fibers from the foraminous material, with the proviso that the fibers suspended and collected have a BET surface area of from 0.2 to 5 m^2 per gram, and with the further provisos that the separator has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and that the separator has a mean grammage of from 20 g/m^2 to 1400 g/m^2 , and ranges in grammage from not less than 85 percent of the mean to not more than 115 percent of the mean.

90. A fibrous sheet plate separator which consists essentially of intermeshed glass fibers produced by suspending glass fibers in a gaseous medium, collecting the suspended glass fibers on a foraminous material, and separating the collected fibers from the foraminous material, with the proviso that the fibers suspended and collected have a BET surface area of from 0.2 to 5 m^2 per gram, and with the further provisos that the fibers in the

separator have a mean length which is only 10% shorter than the mean length of fibers in a mat suitable for use to produce a separator by the wet laid process.

91. A fibrous sheet plate separator as claimed in claim 90 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 85 percent of the mean to not more than 115 percent of the mean.

92. A fibrous sheet plate separator as claimed in claim 90 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 90 percent of the mean to not more than 110 percent of the mean.

93. A fibrous sheet plate separator as claimed in claim, 90, which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

94. In a storage battery as claimed in claim 46, the improvement wherein the fibers in the separator have a mean length which is only 10% shorter than the mean length of fibers in a mat suitable for use to produce a separator by the wet laid process.

95. An improved storage battery as claimed in claim 94 which is a lead acid battery.

96. An improved storage battery as claimed in claim 95 which is a VRLA battery.

97. An improved storage battery as claimed in claim 96 which is an AGM type of battery.

98. A fibrous sheet plate separator as claimed in claim, 90 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 90 percent of the mean to not more than 110 percent of the mean, and a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

99. A fibrous sheet plate separator as claimed in claim, 90 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 95 percent of the mean to not more than 110 percent of the mean, and has a mean grammage of from 20 g/m^2

to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

100. A fibrous sheet plate separator which consists essentially of intermeshed glass fibers produced by suspending glass fibers in a gaseous medium, collecting the suspended glass fibers on a foraminous material, and separating the collected fibers from the foraminous material, with the proviso that the fibers suspended and collected have a BET surface area of from 0.2 to 5 m^2 per gram, and with the further provisos that the separator has a mean fiber length equal to the original fiber length of a fiber made and collected for a wet laid process.

101. In a storage battery as claimed 46, the improvement of a fibrous sheet plate separator which consists essentially of intermeshed glass fibers produced by suspending glass fibers in a gaseous medium, collecting the suspended glass fibers on a foraminous material, and separating the collected fibers from the foraminous material, with the proviso that the fibers suspended and collected have a BET surface area of from 0.2 to 5 m^2 per gram, and with the further provisos that the separator has a mean fiber length equal to the original fiber length of a fiber made and collected for a wet laid process.

102. An improved storage battery as claimed in claim 101 which is a lead acid battery.

103. An improved storage battery as claimed in claim 102 which is a VRLA battery.

104. An improved storage battery as claimed in claim 103 which is an AGM type of battery.

105. In a fibrous sheet plate separator as claimed in claim, 100, the further improvement that the separator has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 90 percent of the mean to not more than 110 percent of the mean, and that the separator has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

106. In a fibrous sheet plate separator as claimed in claim, 100, the further improvement that the separator has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 95 percent of the mean to not more than 110 percent of the mean, and that the separator has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and

ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

107. In a fibrous sheet plate separator as claimed in claim 100, the further improvement that the separator has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and that the separator has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 85 percent of the mean to not more than 115 percent of the mean.

108. In a fibrous sheet plate separator as in claimed in claim 100, the further improvement that the separator has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and that the separator has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 90 percent of the mean to not more than 110 percent of the mean.

109. In a fibrous sheet plate separator as claimed in claim 100, the further improvement that the separator has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and that the separator has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

110. In a fibrous sheet plate separator which consists essentially of intermeshed glass fibers produced by suspending glass fibers in a gaseous medium, collecting the suspended glass fibers on a foraminous material, and separating the collected fibers from the foraminous material, the improvement that the fibers suspended and collected have a BET surface area of from 0.2 to 5 m^2 per gram, and the further improvement that the mean length of the fibers in the separator is greater than the mean length of fibers manufactured for use to produce a separator by a wet laid process.

111. In a storage battery as claimed 46, the improvement of a fibrous sheet plate separator as claimed in claim 110.

112. An improved storage battery as claimed in claim 101 which is a lead acid battery.

113. An improved storage battery as claimed in claim102 which is a VRLA battery.

114. An improved storage battery as claimed in claim 103 which is an AGM type of battery.

115. An improved fibrous sheet plate separator as claimed in claim 110 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 90 percent of the mean to not more than 110 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

116. An improved fibrous sheet plate separator as claimed in claim 110 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 95 percent of the mean to not more than 110 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

117. An improved fibrous sheet plate separator as claimed in claim 110 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 85 percent of the mean to not more than 115 percent of the mean.

118. An improved fibrous sheet plate separator as claimed in claim 110 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 90 percent of the mean to not more than 110 percent of the mean.

119. An improved fibrous sheet plate separator as claimed in claim 110 which has a mean thickness of from 0.07 to 11 mm and ranges in thickness from not less than 85 percent of the mean to not more than 115 percent of the mean, and has a mean grammage of from 20 g/m^2 to 1400 g/m^2, and ranges in grammage from not less than 95 percent of the mean to not more than 105 percent of the mean.

120. In a storage battery as claimed in claim 52, the improvement wherein the separator contains a particulate inorganic material which was suspended in the gaseous medium with glass fibers, and the glass fibers and particulate inorganic material are collected on a foraminous material.

121. A lead/acid battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 6.

122. A lead/acid battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 6, and has a minimum nitrogen BET surface area of at least 1.1 m^2/g.

123. A multi-layer sheet as claimed in claim 6 wherein said second layer contains at least 20% of particulate silica powder, based upon the weight of fibers and silica powder in said second layer.

124. A storage battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 6.

125. A storage battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 6, and has a minimum nitrogen BET surface area of at least 1.1 m^2/g.

126. A storage battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 8.

127. A storage battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 20.

128. A storage battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among

said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 23.

129. A wet acid battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 6.

130. A wet acid battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 6, and has a minimum nitrogen BET surface area of at least 1.1 m^2/g.

131. A wet acid battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 8.

132. A wet acid battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 20.

133. A wet acid battery comprising a case, having alternate negative and positive plates in said case, positive and negative terminals, suitable electrical connections among said plates and said terminals, and separator material between alternate ones of said positive and negative plates that is a multi-layer sheet as claimed in claim 23.

134. A method for producing a fibrous mat useful as a battery separator material which consists of producing acid resistant fibers having a BET surface area from 0.2 to 5 m^2 per gram, projecting the fibers in a gaseous medium, forming the projected fibers into a mat by withdrawing the gaseous medium in which the fibers are being projected though a formaminous surface that has holes sufficiently small that the fibers stay on the formaminous surface, applying a water soluble binder to the mat, compressing the mat, and packaging the compressed mat.

135. A fibrous mat useful a battery separator produced by the method claimed in claim 134.

136. In a storage battery comprising a plurality of lead plates in a closed case, a fibrous sheet plate separator between adjacent ones of said plates, and a body of a sulfuric acid electrolyte absorbed by each of said separators and maintained in contact with each of the adjacent ones of said plates, the improvement wherein said separator is a fibrous mat produced by the method claimed in claim 134.

137. An improved battery as claimed in claim 136 which is a lead acid battery.

138. An improved battery as claimed in claim 136 which is a VRLA battery.

139. A fibrous mat useful as a battery separator as claimed in claim 134 wherein the water soluble binder is inorganic.

140. A fibrous mat useful as a battery separator as claimed in claim 139 wherein the inorganic binder is a sulfate salt.

141. A fibrous mat useful as a battery separator as claimed in claim 140 wherein the binder also includes colloidal silica.

142. A fibrous mat useful as a battery separator as claimed in claim 140 wherein the sulfate salt is magnesium sulfate.

143. A fibrous mat useful as a battery separator as claimed in claim 139 wherein the water soluble binder is organic.

144. A fibrous mat useful as a battery separator as claimed in claim 143 wherein the water soluble binder is of the starch and gum family of polymers.

145. A method as claimed in claim 134 wherein a siliciferous material is suspended in the gaseous material and collected with the fibers as a part of the mat.

146. A method as claimed in claim 145 wherein a gaseous material is directed upwardly toward the fibers in the region where they are being formed, and the siliciferous material is added to the gaseous material that is directed toward the fibers.

147. A fibrous mat useful as a battery separator produced by the method claimed in claim 146.

148. In a storage battery comprising a plurality of lead plates in a closed case, a fibrous sheet plate separator between adjacent ones of said plates, and a body of a sulfuric acid electrolyte absorbed by each of said separators and maintained in contact with each of the adjacent ones of said plates, the improvement wherein said separator is a fibrous mat produced by the method claimed in claim 146.

149. An improved battery as claimed in claim 147 which is a lead acid battery.

150. An improved battery as claimed in claim 148 which is a VRLA battery.

151. A method as claimed in claim 134 wherein the fibers are microfibers

152. A method as claimed in claim 150 wherein the microfibers are glass.

153. A fibrous mat useful as a filter medium produced by the method claimed in claim 146.

154. A fibrous mat useful as sound insulation produced by the method claimed in claim 146.

155. A fibrous mat useful as a thermal insulation produced by the method claimed in claim 146.

156. A fibrous mat useful as a cryogenic insulation produced by the method claimed in claim 146.

157. An article composed of a porous or non-porous film, foil or woven or non-woven fabric and a fibrous mat produced by the method claimed in claim 146 adhered to said film, foil or fabric.

158. An article as claimed in claim 156 wherein the fibrous mat is adhered to an aluminum foil.

159. A fibrous mat useful as an air filter medium produced by the method claimed in claim 146.

160. A fibrous mat useful as a liquid filter medium produced by the method claimed in claim 146.

161. A fibrous mat useful as a hydraulic filter medium produced by the method claimed in claim 146.

162. An article as claimed in claim 156 wherein the fibrous mat is adhered to a lead foil.

163. An article as claimed in claim 156 wherein the fibrous mat is adhered to a woven glass fiber cloth.

164. An improved battery as claimed in claim 147 which uses an electrolyte comprising potassium hydroxide.

165. In a lead acid_ battery comprising a plurality of lead plates in a closed case, a fibrous sheet plate separator between adjacent ones of said plates, and a body of a sulfuric acid electrolyte absorbed and gelled by each of said separators and maintained in contact with each of the adjacent ones of said plates, the improvement wherein said separator sheets

were produced by the method of claim 1451, with the proviso that the fibers suspended and collected have a BET surface area of from 0.2 to 5 m^2 per gram and the combined surface area of the fibers and of the siliciferous material is greater than 1.0 M^2G^{-1}.

166. A fibrous mat as claimed in claim 135 wherein the fibers are synthetic organic microfibers.

167. A fibrous mat as claimed in claim 135 wherein the fibers are polyolefin microfibers.

168. A fibrous mat as claimed in claim 135 wherein the fibers are polyester microfibers.

169. A fibrous mat as claimed in claim 135 wherein the fibers are fluorocarbon microfibers.

170. A fibrous mat as claimed in claim 167 wherein the polyolefin fibers are polyethylene microfibers.

171. A fibrous mat as claimed in claim 167 wherein the polyolefin fibers are polypropylene microfibers.

172. A fibrous mat as claimed in claim 147 wherein the fibers are synthetic organic microfibers.

173. A fibrous mat as claimed in claim 147 wherein the fibers are polyolefin microfibers.

174. A fibrous mat as claimed in claim 147 wherein the fibers are polyester microfibers.

175. A fibrous mat as claimed in claim 147 wherein the fibers are fluorocarbon microfibers.

176. A fibrous mat as claimed in claim 173 wherein the polyolefin fibers are polyethylene microfibers.

177. A fibrous mat as claimed in claim 173 wherein the polyolefin fibers are polypropylene microfibers.

178. A fibrous mat as claimed in claim 173 wherein the polyolefin fibers have hydrophylic surfaces.

179. In a lead acid_ battery comprising a plurality of lead plates in a closed case, a fibrous sheet plate separator between adjacent ones of said plates, and a body of a sulfuric acid electrolyte absorbed by each of said separators and maintained in contact with each of

the adjacent ones of said plates, the improvement wherein said separator sheets were produced by the method of claim 145, with the proviso that the fibers suspended and collected have a BET surface area of from 0.2 to 5 m^2 per gram.